PROPOSED SCOPE FOR THE RISK ASSESSMENT FOR THE NEPERA INCINERATOR, HARRIMAN, NEW YORK

Prepared for

Nepera, Inc.

Prepared by

Stephen G. Zemba, Ph.D.

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1 Introduction

This is a revised version of a document that was previously submitted to the New York State Department of Environmental Conservation in accordance with the compliance schedule for the draft 373 permit for the incinerator operated by Nepera, Inc. This revised document supersedes the August 31, 1994 submittal.

This document outlines a scope-of-work for the human health risk assessment that is to be conducted to assess potential long-term health risks associated with stack emissions from the incinerator operated by Nepera Inc., at its production facility in Harriman, New York. To conduct the health risk assessment for the Nepera incinerator, we propose to apply the basic procedures and methodologies set forth in the Preliminary Health Risk Assessment (PHRA, dated July 27, 1994). The PHRA was previously submitted per the requirements of the compliance schedule established by the New York State Department of Environmental Conservation (NYSDEC). In an effort to avoid repetition, many aspects of the risk assessment protocol are summarized herein, with detailed descriptions provided in the PHRA. Consequently, it is imperative that this scope be read in conjunction with the PHRA.

The following annotated outline describes the principal elements of the PHRA and discusses potential modifications that may be necessary for development of the final risk assessment. The proposed scope essentially follows draft risk assessment guidance developed by the New York State Department of Health (NYSDOH) for the evaluation of stack emissions from municipal solid waste incinerators and hospital waste incinerators. Intended departures from the NYSDOH (1991) draft guidance are noted herein along with discussion of a number of pertinent items not covered by the guidance.

In addition, NYSDOH has raised a number of issues concerning the PHRA (Chinery, 1995) that also apply to the original version of this scope-of-work (as related in Kaminski, 1995).[1] Responses to these comments have been integrated into this revised scope-of-work. For convenience, we have also attached our responses in a format that corresponds directly to NYSDOH's comments (see Appendix A).

Finally, there are a number of items related to the estimation of pollutant emissions that cannot be resolved until the Trial Burn has been completed. As such, we propose to submit a pollutant emission summary within the Trial Burn Report for review by NYSDEC prior to conducting the final health risk assessment. Items to be included in the emission summary are discussed in Section 3.

[1] For reference, copies of these letters have been included in Appendix B.

2 Temporal and Demographic Scope

Most of the items below apply to the *long-term*, or chronic, assessment, which is the typical focus of a multi-pathway risk assessment. The PHRA does not evaluate the potential for short-term health risks. In order to address comments raised by NYSDOH, however, short-term assessment of health risks will be included in the final risk assessment (as discussed further in Section 6).

Adult and child (2½ year-old) exposure scenarios will be considered. Hypothetical maximum exposed individuals (MEIs) will be constructed based upon high-end exposure assumptions. To the extent possible, the risk assessment will be tailored to the characteristics of the Harriman, Monroe, and Woodbury communities that are near the Nepera facility.

3 Pollutants to be Considered and Estimation of Emission Rates

An initial list of the pollutants of concern has been constructed from previous testing of stack gases and waste feed streams at the Nepera facility. The bases of their selection are detailed in the PHRA report.

Pollutants Included in the PHRA

Metals and Inorganic Pollutants	Organic Pollutants
ammonia	2-cyanopyridine
antimony	3-cyanopyridine
arsenic	benzene
barium	ethanol
beryllium	isopropanol
cadmium	methanol
chromium (total)	2-picoline
chromium VI	3-picoline
copper	pyridine
lead	toluene
manganese	
mercury	
nickel	
selenium	
silver	
thallium	
vanadium	
zinc	

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The initial list of pollutants will be reviewed and modified (if necessary) upon completion of the Trial Burn. Pollutants will be added to the list if identified in the course of Trial Burn testing. For example, various polycyclic aromatic hydrocarbons (PAHs) will be included if measured in stack gas testing. Also, pollutants to be evaluated for short-term health effects, such as hydrogen chloride and particulate matter, will be included (see section 6.3). Pollutants presently included on the list that are unrelated to production processes and not components of combusted waste streams at Nepera (*e.g.*, most of the metals) will be deleted from consideration (subject to the approval of NYSDEC) if they are not detected in the Trial Burn.

The list of pollutants to be considered will be submitted to NYSDEC as part of the Trial Burn Report, to be finalized prior to development of the health risk assessment.

Estimates of pollutant emission rates will be developed principally from stack test data collected during the Trial Burn. For organic chemicals, additional consideration of feed stream characteristics may be used when appropriate. Emission estimates of organic compounds will use destruction/removal efficiencies (DREs) based directly upon measurements obtained during the Trial Burn[2]. Present intentions are to measure DREs for both benzene and pyridine. DREs for other compounds will be based on these measured values.

Emission rates will be developed in consideration of anticipated worst-case operating conditions for the Nepera incinerator. Further details of the methods that may be used to supplement stack test results are detailed in the PHRA report. As mentioned previously, the proposed derivation of emission rates for use within the final risk assessment will be submitted to NYSDEC (as part of the Trial Burn Report) for review prior to completion of the risk assessment.

4 Air Dispersion and Deposition Modeling

The protocol for air dispersion modeling was previously set forth by Four Nines, Inc. (1992) and executed within the PHRA. The ISCST2 and COMPLEX1 (in VALLEY mode) models were used to estimate long-term average pollutant concentrations in air over an extensive network of receptor locations. Source parameters included an assumed stack height of 152 feet (corresponding to the Good Engineering Practice [GEP] stack height). Recent air dispersion modeling indicates that an 80-foot stack will be sufficient to satisfy

[2] Evaluation of DREs is one of the primary purposes of the Trial Burn.

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target risk levels (Zemba, 1995). Consequently, Nepera, Inc. has applied for a variance from GEP stack height, proposing to increase the height of the present stack to 80 feet (Martin, 1995).

Models to be used within the health risk assessment will include ISCST2 (with Stewart Air Force Base meteorological data) for simple terrain receptors and a complex terrain screening procedure. Pending future considerations (to be explored within the air dispersion modeling protocol), the COMPLEX1/VALLEY mode approach employed in the PHRA may also be used for the final health risk assessment. It may be desirable, however, to apply the somewhat more elaborate CTSCREEN model in the critical complex terrain areas identified in the PHRA to obtain improved estimates of ambient impacts. Decisions on model implementation will be subject to the approval of NYSDEC.

Within the PHRA, deposition modeling was conducted assuming that contaminants adhere to particulate matter. Based upon (1) CARB algorithms, (2) local meteorological data, and (3) the assumed nature of particulate matter released from the Nepera incinerator, a representative deposition velocity of 0.1 cm/s was selected to calculate pollutant deposition rates from modeled ground-level concentrations in air. Depositions of ammonia and organic species were not considered because of their tendencies to remain in the vapor phase and thus not deposit to an appreciable extent within the study area.

The same procedures are proposed to evaluate pollutant deposition within the final risk assessment, unless data collected during the Trial Burn suggest alternate assumptions.

5 Exposure Assessment

5.1 General Points

- The assessment will principally rely on NYSDOH (1991) draft guidance.
- A multi-pathway risk assessment will be conducted that will rely on air dispersion modeling, deposition estimates, fate and transport modeling in soil, vegetation, and foodstuffs, and water quality modeling. The following figure (reproduced from the PHRA) qualitatively depicts the modeling relationships by which the MEIs are exposed to pollutants in stack emissions.
- Household exposures to the MEIs, which include inhalation and incidental soil ingestion pathways, will be assessed at the point of maximum facility impact determined within the air dispersion study. In addition, vegetables will be assumed to be grown in a backyard garden by the MEIs.

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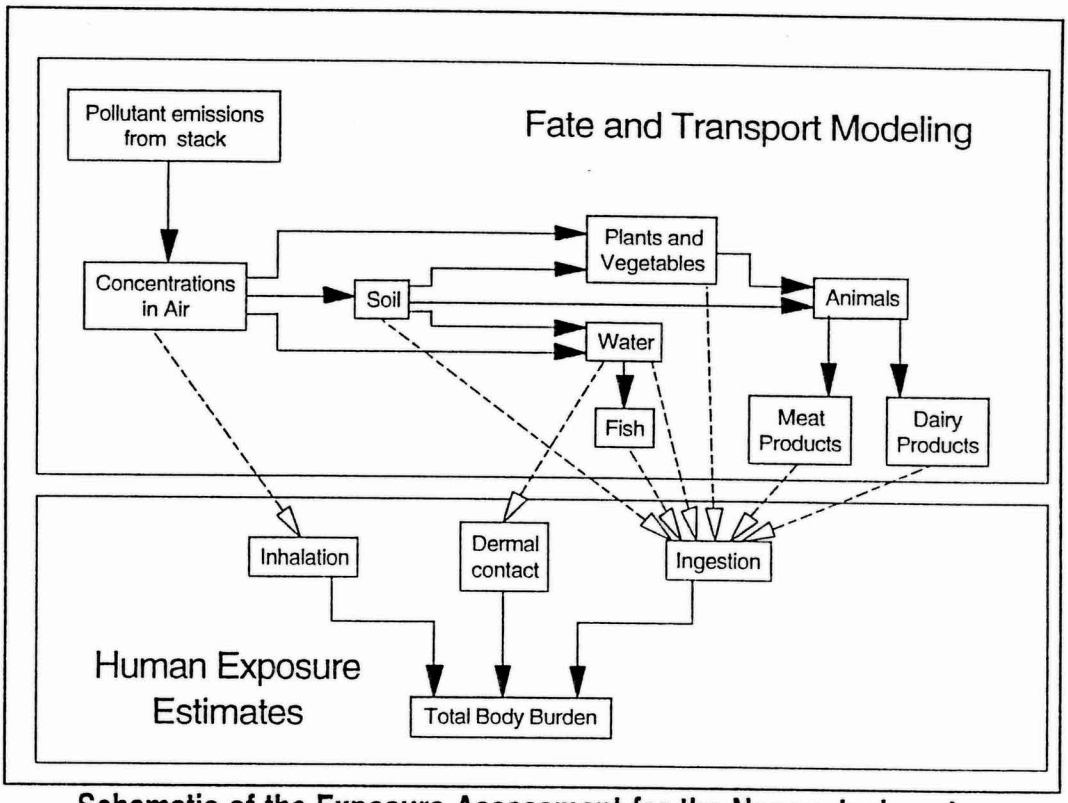

Schematic of the Exposure Assessment for the Nepera Incinerator

- Within the PHRA report, meat and dairy product pathways are also evaluated at the point of maximum impact. Initial reconnaissance of the lands around the Nepera facility identified limited agricultural activities. Consequently, further investigation may be conducted prior to the final risk assessment to select a more realistic and suitable location to evaluate farm-related exposure routes.
- Recreational water-related exposures (fishing and swimming) will be assessed at the water bodies projected to be affected to the highest degree. Lakes and ponds identified in the PHRA included Cranberry, Blythea, Blendale, and Shadowmere Lakes, and an unnamed Swimming Pond (located in Monroe). These lakes and ponds will also be considered in the final risk assessment, along with Walton Lake (see below), which has been identified as a drinking water source. Potential changes in the air dispersion study may require additional water bodies to be considered.
- At the time the PHRA was conducted, limited information indicated that surface waters are not used as public drinking water supplies in the Harriman–Monroe–Woodbury study area. As a conservative measure, drinking water exposures were evaluated at the most-impacted water body

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(as projected by air dispersion modeling). Subsequently, however, it has been determined that the Village of Chester obtains a portion of its municipal water supply from Walton Lake (located in Monroe). Since Walton Lake is an active supply, it will serve as the water body of concern for the drinking water pathway.

5.2 General assumptions — body weights (from NYSDOH, 1991)

Child: 13.2 kg
Adult: 70 kg

5.3 Inhalation

Breathing rates (from NYSDOH, 1991):

Child: 8.6 m^3/d
Adult: 20 m^3/d

5.4 Soil-related pathways

5.4.1 Model

NYSDOH (1991) accumulation model, which assumes 35 years of pollutant deposition into a 5 cm (untilled) or 15 cm (tilled) layer.

5.4.2 Incidental exposure assumptions (from NYSDOH, 1991)

Child: 200 mg/d, 5 d/wk, 6 mo/yr
Adult: 100 mg/d, 2 d/wk, 5 mo/yr

5.5 Vegetable ingestion

5.5.1 Modeling approach for metals

Both direct deposition and uptake from soil will be considered. Methodologies described in NYSDOH (1991). Numerous modeling parameters obtained from NYSDOH (1991) and used within the PHRA will be maintained in the final risk assessment unless more appropriate area-specific information is identified.

5.5.2 Modeling approach for organic chemicals

Within the PHRA, organic pollutants of concern (and ammonia) are assumed not to deposit to soils and vegetation to any significant degree because they are expected to be present predominantly in the vapor phase. The final risk assessment will provide detailed justification for the assumption that the organic compounds of concern partition mainly to the vapor phase. Also, recent research has demonstrated that vapors can be absorbed by vegetation. Procedures recommended by the U.S. EPA (1994) will be followed to evaluate the potential for indirect exposure to organic compounds *via* uptake into vegetation and incorporation into

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terrestrial food-chain pathways. These topics are further discussed in item 3 of the attached response to comments.

5.5.3 Uptake factors from NYSDOH (1991) and (where necessary) Baes et al. (1984) and Travis and Arms (1988).

5.5.4 Deposition parameters in NYSDOH (1991) may be updated with local agricultural data. Presently, NYSDOH (1991) default assumptions are used in the PHRA report and will be maintained unless more appropriate data are identified.

5.5.5 Consumption parameters from NYSDOH (1991) for three types of vegetables:

Child: 0.039, 0.053, and 0.082 kg/d of leafy, exposed, and protected vegetables, respectively

Adult: 0.039, 0.089, and 0.137 kg/d of leafy, exposed, and protected vegetables, respectively

5.6 Beef and dairy products

5.6.1 Steer/cow diet of corn silage, hay, and pasture grass

5.6.2 Uptake/deposition modeling similar to vegetables

5.6.3 Biotransfer factors from NYSDOH (1991) and Baes et al. (1984) for metals, and NYSDOH (1991) and Travis and Arms (1988) for organic chemicals (if appropriate)

5.6.4 Modeling parameters (including local consumption) from NYSDOH (1991):

Child: 0.051 and 0.418 kg/d of beef and milk, respectively

Adult: 0.02 and 0.283 kg/d of beef and milk, respectively

5.7 Fish

5.7.1 Water quality modeling will include both direct deposition to the water surface and deposition to soils within the watershed followed by subsequent erosion into the water body. Soil loss will be evaluated with the Universal Soil Loss Equation and will consider local land use, meteorology, and soil characteristics. Water quality modeling contained in the PHRA will be updated. Topics that will be addressed include (1) correction of errors made in the PHRA modeling and (2) explanation of weighting factors used in the analysis. These topics are detailed in items 4 and 5 of the attached response to comments.

5.7.2 Bioconcentration factors from NYSDOH (1991) and the literature.

5.7.3 Consumption of 1/2 lb/wk (consistent with NYSDEC advisory on fishing licenses).

5.8 Drinking water exposure

5.8.1 Water quality modeling per Section 5.7.1

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5.8.2 Exposure rates (from NYSDOH, 1991):
Child: 1 ℓ/d
Adult: 2 ℓ/d

5.9 Exposures during swimming
5.9.1 Water quality modeling per Section 5.7.1
5.9.2 Dermal absorption and incidental ingestion
5.9.3 Skin permeability rates from the literature
5.9.4 Exposure assumptions based upon U.S. EPA (1988) and area-specific considerations
Child: 2.6 hours/event, 6 events/week, 4 months/year, 0.603 m^2 skin exposed, 50 ml water ingested/hour
Adult: 2.6 hours/event, 2 events/week, 4 months/year, 1.94 m^2 skin exposed, 50 ml water ingested/hour

5.10 Infant exposure from nursing
This exposure route was not evaluated in the PHRA because of the lack of lipophilic compounds within the pollutants of concern. Should lipophilic compounds be identified, this route will be included within the final risk assessment. In this case, the approach outlined in NYSDOH (1991) will be followed.

6 Toxicity Assessment — Health Risk Estimation

6.1 Toxicologic profiles
Brief toxicologic profiles for the chemicals of potential concern will be included as part of our final risk assessment.
6.2 Long-term effects
6.2.1 Lifetime cancer risks
6.2.1.1 Potencies and unit risk values from NYSDOH sources and U.S. EPA databases (IRIS and HEAST). Values in the PHRA will be reviewed for changes and for correction of errors (see item 10 in the attached response to comments).
6.2.1.2 Based upon the adult MEI exposure
6.2.2 Noncarcinogenic risks — hazard ratios: dose/reference dose (RfD)
6.2.2.1 Reference doses and concentrations from NYSDOH sources and U.S. EPA databases (IRIS and HEAST). Values used in the PHRA will be updated if appropriate. Additional reference doses/concentrations for mercury, benzene, and 2-picoline will be considered *per* NYSDOH's

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suggestions (see items 6, 7, and 8 in the attached response to comments).

6.2.2.2 Evaluated for the child MEI, since exposures are higher when expressed upon a *per* body weight basis

6.2.2.3 Lead — uptake/biokinetic modeling for the child MEI to predict increment in blood-lead concentration

6.3 Short-term effects

Short-term risks were not considered within the Preliminary Risk Assessment. However, short-term inhalation risks for two pollutants — hydrogen chloride and particulates — will be evaluated in the final risk assessment.[3] Hydrogen chloride impacts will be evaluated for a 1-hour time period, and particulate impacts will be evaluated over a 24-hour averaging period. We shall couple the highest projected impacts determined from air dispersion modeling with measured rates of emissions (as determined in the Trial Burn). Factors and allowances for off-normal conditions will be derived based upon operating practices at the plant. Projected impacts from the Nepera Incinerator will be added to background levels to obtain total estimates of pollutant concentrations. These total concentrations (from the facility plus from other sources) will then be compared to health-based standards. Ambient air quality data will be considered to establish a background level for particulate matter; NYSDEC will be consulted to identify the most appropriate monitoring station. A background level for HCl will be determined from the literature, since ambient levels of this chemical are not routinely monitored.

7 Risk Characterization

Carcinogenic risks will be calculated as the product of long-term average dose (concentration for inhalation exposure) and carcinogenic potency (unit risk). A lifetime exposure period of 70 years will be assumed. Individual risk estimates will be summed across chemicals and exposure pathways to provide a total upper-bound estimate of incremental cancer risk due to emissions from the Nepera incinerator.

Similarly, hazard ratios will be calculated for noncarcinogenic endpoints as the ratio of the estimated dose (or concentration) derived from facility-related emissions to the reference dose (or concentration) identified in toxicity assessment. An overall hazard ratio will be

[3] Sulfur compounds and formaldehyde, which are also listed in the NYSDOH comment, are not pollutants of concern for the Nepera Incinerator.

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constructed as the sum of all hazard ratios calculated for individual exposure routes and chemicals. Should the hazard index exceed unity, a target-specific analysis will be conducted to investigate different types of non-cancer health risks.

8 References

Baes, C.F., Sharp, R.D., Sjoreen, J., and Shore, R. (1984). *A Review and Analysis of the Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture.* Oak Ridge, TN: Oak Ridge National Laboratory (ORNL–5786).

Chinery, R. (1995). New York State Department of Health. Letter to J. T. Higgins, New York State Department of Environmental Conservation. Dated January 4, 1995. Copy included in Appendix B.

Eisenreich, S.J., Looney, B.B., and Thornton, J.D. (1981). Airborne organic contaminants in the Great Lakes ecosystem. *Environ. Sci. & Tech. 15(1)*:30–38.

Four Nines, Inc. (1992). *Dispersion modeling and risk assessment protocol, Nepera, Inc., Harriman, New York.*

Kaminski, S. (1995). New York State Department of Environmental Conservation. Letter to M. A. Leduc, Nepera, Inc. Dated February 14, 1995. Copy included in Appendix B.

Martin, S.T. (1995), Nepera, Inc. Letter to S. Kaminski, NYSDEC, discussing process changes and incinerator stack height variance. Dated February 16, 1995.

NYSDOH (1991). *Guidance for Exposure Assessment of Municipal Solid Waste and Hospital Waste and Hospital Waste Incinerator Emissions.* Albany, NY.

Terbush, B.R. (1992). New York State Department of Environmental Conservation. Letter to S.T. Martin, Nepera, Inc., dated May 15th, discussing dispersion model and risk assessment protocol comments.

Travis, C.C., and Arms, A.D. (1988). Bioconcentration of organics in beef, milk, and vegetation. *Environ. Sci. Technol. 22*:271–274.

U.S. EPA (1988). *Superfund Exposure Assessment Manual (SEAM).* Washington, DC: Office of Remedial Response. EPA/5401-88/001.

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U.S. EPA (1994). Estimating exposure to dioxin-like compounds. Volume III: Site-specific assessment procedures. Review draft. Washington, DC: Office of Research and Development. EPA/600/6-88/005Cc.

Zemba, S.G. (1995), Cambridge Environmental Inc. Letter to Sam Martin of Nepera, Inc. describing air dispersion modeling and stack height requirements. Dated February 16, 1995, and submitted to NYSDEC as an attachment to Martin (1995).

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Appendix A: Response to NYSDOH comments on the PHRA

Response to

Comments on "A Preliminary Health Risk Assessment for the Nepera Incinerator" (Attachment to the letter from Robert Chinery to John T. Higgins dated January 4, 1995)

Stephen G. Zemba, Ph.D., and Laura C. Green, Ph.D., D.A.B.T.
Cambridge Environmental Inc.

March 6, 1995

We are grateful to Judith Johnson, Robert Chinery, and their colleagues at NYSDOH for their review of our report, "A Preliminary Health Risk Assessment for the Nepera Incinerator." As detailed below, we will indeed incorporate the changes suggested by NYSDOH into our final risk assessment. Our preliminary risk assessment, as requested by NYSDEC, was somewhat of a screening exercise, intended to give order-of-magnitude estimates of impacts. Following completion of the trial burn, we plan to incorporate measured emissions data, along with other refinements, into a more complete, final risk assessment. This latter document will be written for both NYSDOH and the general public, and so will contain additional documentation and explanations, some of which were lacking in our preliminary report.

The following points describe our intended approaches for addressing the comments raised by NYSDOH regarding our Preliminary Health Risk Assessment (PHRA) of the Nepera Incinerator. The numbers of each point correspond to those used in Mr. Chinery's letter.

1. In our final risk assessment, emission estimates of organic compounds will use destruction/removal efficiencies (DREs) based directly upon measurements obtained during the Trial Burn[1]. Present intentions are to measure DREs for both benzene and pyridine. DREs for other compounds will be based on these measured values.

[1] Evaluation of DREs is one of the primary purposes of the Trial Burn.

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2. Short-term inhalation risks for two pollutants — hydrogen chloride and particulates — will be evaluated in the final risk assessment.[2] Hydrogen chloride impacts will be evaluated for a 1-hour time period, and particulate impacts will be evaluated over a 24-hour averaging period. We shall couple the highest projected impacts determined from air dispersion modeling with measured rates of emissions (as determined in the Trial Burn). Factors and allowances for off-normal conditions will be derived based upon operating practices at the plant.

   Projected impacts from the Nepera Incinerator will be added to background levels to obtain total estimates of pollutant concentrations. These total concentrations (from the facility plus from other sources) will then be compared to health-based standards. Ambient air quality data will be considered to establish a background level for particulate matter; NYSDEC will be consulted to identify the most appropriate monitoring station. A background level for HCl will be determined from the literature, since ambient levels of this chemical are not routinely monitored.

3. In our final risk assessment, we will provide detailed justification for our assumption that the organic compounds of concern partition mainly to the vapor phase (as opposed to being mainly particle-bound). Our assumption is supported by Eisenreich *et al.* (1981), who state that organic chemicals with vapor pressures greater than 10^{-4} mm Hg "should exist almost entirely in the vapor phase" (p. 31). Based on a preliminary search, all organic chemicals considered in the PHRA have vapor pressures well above 10^{-4} mm Hg (the lowest value, for 3-cyanopyridine, is 0.4 mm Hg).

   It is possible that additional chemicals of concern will be identified in the Trial Burn. Based upon the criteria outlined in Eisenreich *et al.* (1981), these chemicals will be assumed to partition between vapor and particle-bound phases based upon their vapor pressure.

   Organic pollutants assumed to be present in the vapor phase will be evaluated further for indirect exposure *via* uptake into vegetation and incorporation into terrestrial food-chain pathways. Procedures recommended by the U.S. EPA (1994)[3] will be followed, and, if intermediate results are found to be significant, analyses of food-chain exposure will be

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[2] Sulfur compounds and formaldehyde, which are also listed in the comment, are not pollutants of concern for the Nepera Incinerator.

[3] The methods in U.S. EPA (1994) include the research of Bacci *et al.* (1990, 1991) and other relevant studies.

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included in the subsequent risk assessment. All procedures and assumptions will be documented and supported.

4. We have reviewed our estimation of the mercury concentration in Cranberry Lake and have identified minor errors in our calculations that overestimate by about 20%.[4] Based on conversations with Judith Johnson of the Department of Health, we find that this difference alone is not large enough to account for our apparently high concentration. Rather, choice of model parameters are the likely source of the difference between our calculations and the Department of Health's estimates. We have not been able to identify lake-specific data for Cranberry Lake, and consequently have been very conservative in selecting parameter values designed to overestimate pollutant concentrations in Cranberry Lake (as is appropriate in a screening model). Unless we obtain information data that would justify more liberal assumptions, we will maintain our conservative approach in our final health risk assessment.

5. Weighting factors serve two purposes within the estimation of contaminant concentrations in Cranberry Lake and Swimming Pond. In each case, weighting factors were assigned based upon professional judgement of geographic data. The first set of weighting factors were used to estimate area-average impacts from the results of air dispersion modeling. The boundaries of watershed drainage areas were estimated from elevation contours contained on topographic maps. Each of the watersheds considered in Table 4.3 of the PHRA encompassed a number of different receptor locations within the air dispersion modeling grid. Each air modeling receptor located in or near a watershed is assigned a weighting factor depending upon its position relative to the land and water surface areas within the watershed. Receptor locations completely within the watershed were assigned a value of 1, and those near the edges were assigned values of 0.5. Within this system, water and land surfaces were also differentiated.

   A second set of factors was employed in Table 4.11 to weight the differing erosion characteristics of soil types within each watershed. These data were used as partial input to the Universal Soil Loss Equation. For each watershed, relative fractions of soil types were estimated from area-specific soil survey maps published by the U.S. Geological Survey. Soil-specific properties required by the Universal Soil Loss Equation were then averaged accordingly.

   We note that while each of these steps requires some degree of judgement, the procedure is significantly better (from a site-specific standpoint) than attempting to

[4] The 20% error uniformly applies to all chemicals considered in the PHRA.

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estimate single values for each parameter that would then be applied uniformly over watersheds that are in fact heterogeneous in character.

The final risk assessment will elaborate on the methods employed in deriving weighting factors and will provide references to maps and other information utilized.

6. We acknowledge that ATSDR (1994) has developed a more conservative reference concentration for evaluating inhalation exposure to elemental mercury. We intend to review its derivation and will incorporate this RfC in our final risk assessment if appropriate.

7. We will review the proposed reference dose cited for benzene and use it if appropriate in our final health risk assessment.

8. We have obtained the inhalation study of 2-picoline conducted by Dow Chemical. We will review the study and use the results as appropriate (we have also forwarded a copy to Dr. Thomas Johnson at NYSDOH). If the study contains relevant information for deriving reference concentrations, we will use it in the final risk assessment. Otherwise, we will maintain our surrogate use of pyridine to evaluate the toxicity of alkyl pyridines.

9. Brief toxicologic profiles for the chemicals of potential concern will be included as part of our final risk assessment.

10. We acknowledge our error in footnote e of Table 6.2 — it will be corrected to match the cancer potency estimates for ethanol that are provided in the table.

Additional references

Eisenreich, S.J., Looney, B.B., and Thornton, J.D. (1981). Airborne organic contaminants in the Great Lakes ecosystem. *Environ. Sci. & Tech. 15(1)*:30–38.

U.S. EPA (1994). Estimating exposure to dioxin-like compounds. Volume III: Site-specific assessment procedures. Review draft. Washington, DC: Office of Research and Development. EPA/600/6-88/005Cc.

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Appendix B: Copies of Relevant Correspondence

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Specific comments regarding this health risk assessment are attached. If you have any questions, please contact Ms. Judith Johnson at (518) 458-6409.

Sincerely,

Robert Chinery, P.E.
Chief, Exposure Assessment Section
Bureau of Toxic Substance Assessment

JAJ/94243PRO0465

Attachment

cc: Dr. Horn - NYS DOH
Dr. Grey/Dr. Johnson - NYS DOH
Ms. Johnson - NYS DOH
E. Dassatti/S. Kaminski - NYS DEC
G. Pallente - NYS DEC
R. Stanton - NYS DEC, Region 3, RAPCE

Comments on "A Preliminary Health Risk Assessment for the Nepera Incinerator"

1. For the organic compounds, average emission rates are estimated for the expected rate of incineration assuming a 99.99% destruction and removal efficiency. The consultant should provide justification that this method used to generate organic emission rates is representative of what is actually emitted by the Nepera facility.

2. The HRA did not include an assessment of risks due to short-term impacts for the respiratory irritants (e.g., formaldehyde, hydrogen chloride, respirable particulates, sulfuric acid, etc.). If these compounds are emitted from this facility during normal operation, start-up, shut-down or upset conditions they should be evaluated in this HRA.

3. The consultant assumed that organic contaminants of potential concern were present as vapors and not associated with particulate emissions. No scientific justification was provided for this assumption. We suggest that the consultant compare the vapor pressures of the organic contaminants of concern with vapor pressures of compounds which are known to adsorb to atmospheric particulates to show that these compounds would be mostly present in the vapor phase.

   Contaminants present only in the vapor phase should not be excluded from an assessment of indirect exposure pathways without justification. The uptake of organics into plants can occur via translocation from contaminated soils and vapor uptake from the air (Bacci et al., 1990). Bacci et al. (1991) evaluated the relationship between an organic chemical's n-octanol/water partition coefficient and the bioconcentration factors of organic chemicals in plants. The consultant should review the most recent literature on vapor uptake in plants to assess the significance of bioconcentration of the organic contaminants of potential concern which are associated with the Nepera facility. The consultant should justify in the HRA whether or not the vapor uptake pathway is a significant route of exposure.

4. The consultant's estimation of the mercury concentration in Cranberry Lake appears high. The consultant should check the estimation of all contaminant concentrations in the lake.

5. The consultant used weighting factors to evaluate the contaminant concentrations in Cranberry Lake and Swimming Pond. A description and scientific justification should be provided for these weighting factors.

6. The consultant used a reference concentration of 0.3 $\mu g/m^3$ to evaluate noncarcinogenic inhalation risks for mercury (U.S. EPA, 1993). The Agency for Toxic Substances and Disease Registry recently derived a chronic inhalation minimal risk level of 0.014 $\mu g/m^3$ for inorganic mercury (ATSDR, 1994). If this value is used to estimate the risks for inhalation mercury exposure, the hazard index is still below unity, but 21-fold higher than the one calculated by the consultant.

7. In 1986, the U.S. EPA proposed a reference dose of 7E-4 mg/kg/day for benzene (U.S. EPA, 1986 as cited in ATSDR, 1987) based on dose-related leukopenia (a decrease in blood leukocytes) in a six-month study in rats (Wolf, 1956). Application of this reference dose to the consultant's estimates for benzene exposure also yields hazard indices less than unity.

   The consultant evaluated risks for 2-picoline, 3-picoline and alkyl pyridines by using the toxicity value for pyridine as a surrogate. A six-month study which exposed rats to 2-picoline via inhalation (Dow Chemical, 1983) should also be considered in evaluating the noncarcinogenic risks.

9. The preliminary health risk assessment does not include chemical-specific toxicological profiles. A brief description of the toxicological properties for each contaminant of concern, particularly for chemicals having no established toxicity values, would be a useful addition to the health risk assessment. The toxicity profiles should also include a brief description of the scientific rationale for the choice of surrogate toxicity values, or for deriving toxicity values from lowest-observed-effect levels or no-observed-effect levels from the toxicological literature.

10. Footnote e in Table 6.2 incorrectly states that the consultant calculated an inhalation cancer potency factor for ethanol from the oral reference dose. The footnote should indicate that this value was derived from the consultant's oral cancer potency factor.

REFERENCES

ATSDR (Agency for Toxic Substances and Disease Registry). 1987. Draft Toxicological Profile for Benzene. Oak Ridge, TN: Oak Ridge National Laboratory.

ATSDR (Agency for Toxic Substances and Disease Registry). 1994. Toxicological Profile for Mercury (Update). U.S. Department of Health and Human Services. Atlanta, GA: U.S. Public Health Service. ATSDR/TP-93/10.

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Dow Chemical Company. 1983. Six Month Inhalation Study of A-Picoline in Rats. United States Environmental Protection Agency. Office of Toxic Substances. Document Number 40-8341086.

U.S. EPA (United States Environmental Protection Agency). 1986. Volatile organic chemicals. Washington, DC: Criteria and Standards Division and Technical Support Division, Office of Drinking Water (Cited in ATSDR, 1987).

U.S. EPA (United States Environmental Protection Agency). 1993. Health Effects Assessment Summary Tables. Annual Update. Cincinnati, OH: Office of Research and Development.

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TABLE 1

Preliminary Health Risk Assessment for the NEPERA Incinerator

	CANCER RISK ESTIMATION COMPARISON	
	NYS DOH Adult MEI	NEPERA Adult MEI
Arsenic	7.93×10^{-6}	9.04×10^{-8}
Beryllium	2.34×10^{-9}	4.02×10^{-9}
Cadmium	2.13×10^{-6}	2.09×10^{-8}
Chromium (+6)	6.15×10^{-6}	6.03×10^{-6}
Nickel	4.90×10^{-7}	4.83×10^{-7}

NA = not applicable

cap/95003PRO0151

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York, 12233-7252
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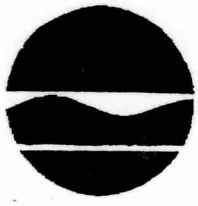

Langdon Marsh
Commissioner

February 14, 1995

Mr. Maurice A. Leduc
Director of Regulatory Affairs
Nepera, Inc.
Route 17
Harriman, New York 10926

Dear Mr. Leduc:

Re: Risk Assessment Protocol

The Department of Health (DOH) completed its review of the referenced document entitled, "Proposed Scope for the Risk Assessment for the Nepera Incinerator, Harriman, N.Y.," dated August 31, 1994. Their comments are similar to those previously given on the document entitled, "A Preliminary Health Risk Assessment for the Nepera Incinerator," dated July 27, 1994 and submitted to Nepera by this Department on January 12, 1995.

Nepera should amend the protocol by incorporating DOH's comments on the preliminary health risk assessment, and then resubmit four copies of the revised protocol within thirty (30) days from the date of this letter. The revised protocol will be used for all future risk assessments and it could require future modification if new parameters need to be added for the trial burn.

Should you have any questions, please contact me or Mr. Thomas John at (518) 457-9696.

Sincerely,

Steve J. Kaminski

Steve J. Kaminski
Supervisor
Hazardous Waste, Reg. 3 Section
Bureau of Eastern Haz. Waste Programs
Division of Haz. Substances Regulation

cc: G. Pallante-Air Resources
R. Stanton-Reg. 3
R. Aldrich, Reg. 3
T. John